OFFICE OF THE ATTORNEY GENERAL OF TEXAS

AUSTIN

GERALD C. MANN
ATTORNEY GENERAL

Dr. George W. Cox
State Health Officer
Austin, Texas

Dear Sir:

Opinion No. O-2402
Re: Article 4444, R. C. S., 1925, does embrace Underground waters

We acknowledge receipt of your letter of May 21, 1940, requesting an opinion of this department regarding the applicability of Article 4444, Revised Civil Statutes, 1925, to underground waters of this State. You ask whether the City of Temple has violated the provisions of this statute. The pertinent part of Article 4444 to which you refer is as follows:

> "No person, firm, corporation, private or municipal shall pollute any water course or other public body of water by throwing, casting, or depositing or causing to be thrown, cast or deposited any crude petroleum, oil or other like substance therein, or pollute any water course or other public body of water from which water is taken for the uses of farm live-stock, drinking and domestic purposes in this state, by the discharge directly or indirectly of any sewage or unclean water or unclean or polluted matter or thing therein, or in such proximity thereto, that it will probably reach and pollute the waters of such water course or other public body of water from which water is taken for said uses. . . ."

The statute refers simply to any water course or public body of water without distinction between surface and sub-surface waters. If underground waters may constitute public waters, then we deem them undoubtedly to have been included by the Legislature, because the statute embraces all public waters without exception. Underground waters have been generally classed as either (a) underground streams with a current of flow

in a definite course and (b) percolating waters, percolating aimlessly without definite direction, referred to as "diffused percolating waters." See section 1188, Kinney on "Irrigation and Water Rights."

Underground streams as thus defined have been universally held to constitute public waters in the same manner as surface streams. Chief Justice Cureton speaking for the Supreme Court in the leading case of Texas Company vs. Burkett, 296 S.W. 273 recognized by implication the public character of subsurface streams which are not subject to private ownership. He said: "In other words, insofar as this record discloses, they were neither surface water nor subsurface streams with defined channels, nor riparian water in any form, and therefore were the exclusive property of Burkett." 296 S.W., at p. 278.

In Corpus Juris Vol. 67, p. 834, it is said: "Where a subterranean stream flows in a distinct, permanent, well known and defined channel, it is governed by the same rules as applied to a natural watercourse on the surface. . . ."

In Maricopa Co. Mun. Water Conservation District No. 1 vs. Southwest Cotton Company, 4 P. (2d) 369, it was held that the characteristics of a "water course" whether surface or subterranean are that it shall have a channel consisting of a well-defined bed and bank, and current of water.

It is stated in Long's work on irrigation, sec. 92, that "where waters connect or gather in a stream flowing in a defined channel, no distinction exists between such subsurface streams and streams flowing upon the surface." (Italics ours)

It is our opinion therefore that Article 4444 Revised Civil Statutes, 1925, includes subsurface streams as public waters courses on bodies of water. There is another type of underground water, in all respect the characteristics of which do not conform to those of either of the two general classes of underground water referred to above. This class has been judicially recognized though not generally as a distinct class. In Corpus Juris, Vol. 67, p. 836, it is said:

> "The general rule vesting the ownership of percolating water in the owner of the land has been held not to apply to the waters of an artisian basin underlying the lands of several owners nor to continuous subterranean waters permeating horizontally throughout a basin between an upper and lower impervious stratum,

> and in which there is more or less movement, both perpendicular and horizontal, through the earth and rock."

and at page 834, in Corpus Juris, Vol. 67, it is said:

> "Where a subterranean stream flows in a distinct, permanent, well known and defined channel, it is governed by the same rules as applied to a natural water course on the surface, and the owners of land beneath which it flows have the same right with respect to it as riparian proprietors have with respect to a stream on the surface, conditioned on the water coming to his land in a natural flow, regardless of whether or not it is under pressure. Also the rules as to riparian rights of owners on a natural water course on the surface extends . . . to large bodies of underground water located in well defined strata. . . ."

In the case of the City of Los Angeles vs. Hunter, 105 Pac. 757; 156 Cal. 603, we find that:

> "'Percolating waters', in the common law sense of the term, are those that are vagrant, wandering drops, moving by gravity in any and every direction along the line of least resistance. The term does not include waters percolating only in the sense that they form a vast mass of water confined in a basin filled with detritus, always slowly moving downward to the outlet in conformity with the physical law to attain a uniform level."

In the Los Angeles case, the Supreme Court of California held that the city of Los Angeles was entitled to an injunction against an aggregate of two hundred and seven defendants from pumping water from the sands of San Fernando Valley. While there was a finding on the part of the court that the waters developed in the wells of the appellants are part of the subterranean flow of the Los Angeles River, the court nevertheless recognized the fact that the water did not in fact support the surface flow as an ordinary underflow of water, and therefore it proceeded to distinguish the percolating waters from ordinary percolating waters and declared them to be of such a character

as essentially to constitute a "flow." Had the valley waters actually constituted the underflow of the river, it would under the decisions have been considered a part of the river and there would have been no need to distinguish such water from ordinary or diffused percolating waters. The court said:

> "Unquestionably the cutting off of this supply would as completely destroy the Los Angeles River as would the cutting off of the Great Lakes destroy the St. Lawrence. San Fernando Valley may indeed be regarded as a Great Lake filled with loose detritus, into which the drainage from the neighboring mountains flows, and the outlet of which is the Los Angeles River. Impeded by the soils these waters of course move more slowly than they would in an open lake; but unquestionably the general movement of practically all is southeasterly in the narrows, through and out of which flows the Los Angeles River proper. Unquestionably also a serious interruption of or interference with this supply would certainly impair the volume of water carried by the Los Angeles River as though the interruption and interference were with a surface flowing tributary thereof. The waters of the San Fernando Valley are therefore not 'percolating waters' in the common law sense of the term, vagrant, wanderings drops moving by gravity in any and every direction along the line of least resistence. These waters percolate it is true but only in the sense that they form a vast mass of water confined in a basin filled with detritus, always slowly moving downward to the outlet in the effort in conformity with physical laws to obtain a uniform level.
>
> "So it is insisted by appellant that these waters are percolating waters, and that of them they have the common law right of absolute ownership, as modified in this state only by the doctrine of Katz vs. Walkinshaw, supra, namely that the quantum of water which they use shall be in reasonable proportions to the whole thereof, and that the water so taken shall be used upon the surface soil of the basin, or, at least, not carried away for exterior use, to the injury of any owners of land within the basin."

In California even diffused percolating waters as indicated above are subject to appropriation with the limitation that they shall not be appropriated beyond a reasonable use, proportionate to the whole thereof, In Texas percolating waters are

not subject to appropriation. In the above stated case the City of Los Angeles in order to assert its rights to the entire use of all of the water, found it necessary to show that the subject waters did not fall within the category of ordinary percolating waters, admitting that such waters were in a sense percolating. The court said: "the waters of the San Fernando Valley therefore are not 'percolating waters' in the common law sense of the term. . . ." So also here by reason of the great public interest inhering in reservoirs of underground waters that are confined within definite strata, bearing all of the characteristics of a regular surface or sub-surface stream except that their flow is impeded by sand, the courts of this State we believe will apply the same distinction as applied by the California courts holding that such waters are not ordinary percolating waters in the common law sense. The rule ordinarily appertaining to percolating waters in Texas would not therefore apply. Underground strata or sands saturated with slowly moving water in a definite direction and within confined limits, have dimensions and direction ascertainable with scientific accuracy. This is clearly shown by scientific paper on the subject attached hereto. This type of underground water can properly be classed as a watercourse and it is our opinion that it is. Insofar as we can find, our Texas courts have not passed specifically upon the character of such waters, though without the point being involved, there appears to be certain implications that would tend to exclude them as public waters. For instance in the Burkett case, emphasis is placed upon "definite channels" as a characteristic of underground streams. And it was said that in the absence of proof to the contrary, underground waters are presumed to be percolating waters. The previous difficulty in ascertainment of the physical character of specific underground water has led the courts in the absence of scientific exactness, apparently to adopt a rule of convenience in the absence of anything better and to refer to all percolating waters without distinction as part and parcel of the land and to further assume that all waters are percolating waters unless proved otherwise. We believe the science of hydrology, that is, the study of underground waters has advanced in comparatively recent years to a degree of certainty as to warrant some measure of discrimination on the part of the courts, requiring them to abandon the above described presumption altogether and to distinguish the different types of percolating waters.

We will here outline the characteristics presently recognized in the two general classes of underground waters as

reflected by our search of the cases and then list and compare with them the characteristics of stratum water, showing that the latter more nearly conform to watercourses and should be treated as such.

Mere diffused percolating waters:
(a) they percolate;
(b) in any and all directions by gravity alone;
(c) moving along the line of least resistance other than in confined channels with sides, ceiling and bottom.

Underground streams of watercourses:
(a) flow by force of gravity and by force of an even constant waterhead;
(b) in a single definite direction;
(c) within confined limits or channel;
(d) in currents.

Underground stratum waters:
(a) they percolate;
(b) by force of gravity and uniform head of water;
(c) in a given direction;
(d) within confined limits, between impervious upper and lower strata of earth with banks confining the water between the strata.

In comparison we see that the stratum waters bear all of the characteristics of underground watercourses except that the waters do not flow in currents, but by percolation. Aside from a comparison of physical characteristics reflecting more similarity with watercourses than strictly percolating waters, there are considerations of public welfare and use which impel the conclusion that regardless of where the ownership may rest, the public at large has more need for the use of large underground reservoirs of water contained within strata than even of its surface streams.

In the case of Hinton vs. Little, et al, the Supreme Court of Idaho in 1931, 296 Pac. Rep. 582 held that the water from a stratum as described above was subject to appropriation and therefore not subject to the rule of private property appertaining in the case of ordinary percolating water. The opinion reads:

"The complaint alleges . . . that the territory in question is underlaid at a depth of from 200 to 300 feet, . . ., by subterranean waters con-

> fined horizontally between this upper impervious stratum and lower stratum, are of such a nature to support this subterranean water when artificial openings are made in the upper stratum to, and in some instances above the ground. Laterally the subterranean waters are evidently continuous and <u>permeate</u> throughout the basin. . . ."

The strength of this case as authority in support of the proposition that a stratum of water which "permeates throughout the basin" constitutes water subject to appropriation, is weakened by the fact that the court points out that in Idaho even diffused percolating waters without a definite course of movement are subject to appropriation. While Texas courts have declared percolating waters, moving without definite direction as not subject to appropriation, in our opinion they will follow the actual decision of the Idaho case holding that flowing waters permeating a defined stratum, are subject to appropriation as a "body" of water. Our courts would undobtedly take judicial knowledge of the fact that many of our Texas cities including its largest, Houston, take their municipal supply of water from defined water strata. Such strata bear a continuous flow of millions of gallons of water. Notwithstanding the slowness of movement the water available from them is tremendous. We cannot believe that our courts would hold such waters to constitute percolating waters within the sense that that term is ordinarily used, that is, diffused percolation.

The natural geological conditions of the county have impelled various treatments on the part of the courts of underground waters. Western States have declared mere percolating waters to be public waters and not subject to private ownership. In them, water is of course very scarce, and the public consideration impelled the courts to declare them to belong to the public. Our Supreme Court has already classified Texas as other than an arid State and has declared mere percolating waters to belong to the landowner. But in applying the reasoning underlying the decisions of both arid and semi-arid states, we find the public need for reliance upon stratum water in Texas is so great, as to impell we believe, the courts to declare it to bear a public interest not subject to private ownership any more than our surface or subsurface streams.

The designation of public streams as public was at common law a matter of judicial pronouncement; so also the designation of underground streams as public waters has been a

matter of judicial determination as distinguished from legislative, While these legal concepts grew up under the common law, as compared to others, their origin is comparatively recent. It is reported that the first case defining underground waters was handed down in England in 1840. The science of underground waters has developed only recently. With increasing efficiency it has only been within the last fifty years that scientists have been able to locate and determine with reasonable certainty the existance, the course and size of underground stratas of water. At one stage, of the development, which may in certain states yet persist, the courts declared that only underground streams that could be traced from surface indications would be declared to be a public stream and not subject to private ownership. See 67 Corpus Juris. p. 834. Courts at a time when scientific methods for ascertainment of the character of underground waters was so meager, sought, in defining important property rights to declare them only upon certain visible surface indications. With the development of scientific methods an application of the same reasoning would direct that underground strata of water be treated in the same manner as underground streams or surface streams. As reservoirs for public use their importance is even greater than surface streams. The storage is permanent and of capacities far greater than the average artificial storage. We are unable to attribute any reason originally impelling the courts to declare surface and subsurface streams to be of public character, that do not presently give weight to the conclusion that when the issue is squarely put to our Texas courts, strata of water should also be declared to be of a public nature. Emphasizing this point we attach hereto excerpts from a written statement on "The Movement of Underground Water" prepared by Honorable Walter N. White, Senior Hydrolic Engineer with the United States Geological Survey. This statement shows the similarity of stratum water with streams and emphasizes the great use of such waters by the public in Texas.

In answer to your inquiry, therefore, underground water courses and bodies of water, including strata, but not mere percolating waters, are public waters within the purview of Article 4444, Revised Civil Statutes, 1925. As to whether the particular waters affected by the sewer system of the City of Temple, constitute a water course or a body of water, are questions of fact which we cannot answer.

You have asked what recourse the parties whose wells are damaged will have in the event the waters affected are not

included within the purview of Article 4444. If such waters are found to be mere diffused percolating waters and therefore subject to private ownership it follows that the public would have no property interest in them and the parties would be relegated to a private suit for damages, or injunction for the prevention of the nuisance.

Very truly yours

ATTORNEY GENERAL OF TEXAS

By (Signed) Hugh Q. Buck
Hugh Q. Buck
Assistant

HQB:db

APPROVED AUG 22, 1940

(Signed) Grover Sellers

FIRST ASSISTANT
ATTORNEY GENERAL

APPROVED OPINION COMMITTEE
By BWB
Chairman

THIS OPINION CONSIDERED AND
APPROVED IN LIMITED CONFERENCE

THE MOVEMENT OF UNDERGROUND WATER IN TEXAS

By
Walter N. White
July 23, 1940

Ground water, in its origin, movement and ultimate disposal, is closely analogous to surface water. The source is the same--rainfall. All of the water we use in Texas must first have fallen as rain or snow. Some of this water runs off quickly into the streams, some evaporates, and some seeps into the ground where it falls. A part of the water that sinks into the ground is returned to the air by evaporation, and a part is carried back into the air by transpiration through plants, some of which are deeply rooted. The remainder may move downward until it joins the water contributed by previous rains in the zone of saturation where all of the openings in the rocks are completely filled with water. We call the upper surface of the saturated zone the water table. The water table is seldom flat, but usually slopes in the same general direction as the surface of the ground.

Both surface water and ground water practically everywhere are moving from areas of intake toward an outlet. The rate of movement of both varies directly with the slope of the stream and indirectly with the resistance or friction produced by the stream bed or ground-water aquifer. Both seldom originate on the property of the person or corporation that used the water.

A surface stream is confined within a well defined channel, the location of which is clearly apparent. Ground water also moves in restricted channels which altho not so apparent can be determined.

The interrelationship between the underground waters and streams is a close one. A large proportion of the water that reaches the Gulf makes its journey in part on the surface and in part underground. All Texas streams that have a fairly constant flow of clear or moderately clear water are fed from underground sources. On the other hand practically all the streams of the State contribute quantities of water to the underground supplies in parts of their courses.

The important water-bearing formations of Texas underlie great areas. The Carrizo sand for example underlies the greater part of the Texas Costal Plain. This does not mean that the water in these formations is percolating aimlessly in any or every direction. On the contrary, it moves everywhere in a definite direction and with a definite slope or gradient in accordance with well known hydraulic laws. The direction and amount of slope or gradient of a surface stream can be determined by leveling and so can the direction and amount of slope of an underground stream. In the case of the surface stream the level traverse is run so as to connect points on the surface of the stream. In the case of the underground stream the levels are run so as to connect measuring points at the surface of a large number of wells. Then from the level data and from measurements to the water levels in the wells a contour map can be constructed which will be similar to a topographic map with the difference that the contours are drawn on the water table or artesian surface

instead of on the surface of the ground. From the contour map the direction of the underground movement can be determined for it must be at right angle to the contours just as the maximum slope of the land is at right angle to the contours drawn on the land surface. The rate of movement of water is proportional to the gradient and the transmissability of the formation The gradient is indicated by the distance between the contours, and the transmissability of the formation can be determined either from laboratory tests of water-bearing materials, or from pumping tests in the field. From the two factors, gradient and transmissability, the rate of movement of the ground water and the volume of the underground flow per linear mile can be computed.

Perhaps the most outstanding differences between ground water and surface water is in the rate of flow. In gravel, sand or sandstone ground water moves through small spaces between the pebbles or sand grains. In rock such as quartzite, granite and limestone it moves along cracks and crevices. In limestone the water has a tendency to dissolve the sides of the crevices and enlarge them into channels of considerable size so that in some cases the water may move underground at a rate comparable with surface streams.

The Edwards limestone is the principal source of the huge springs which appear at intervals along the Balcones Fault zone from the vicinity of Del Rio eastward and northeastward to Austin and beyond. The water supply in this formation is derived from rainfall and seepage from streams on a band outcrop which

parallels the north side of the Fault zone. Whole rivers disappear in crossing this band of outcrop. An estimate based largely on stream gaging records indicates that these losses from the Nueces, Frio, Dry Frio, Sabinal and Medina rivers may average about 140,000 acre-feet a year, the equivalent of a continuous flow of 90,000 gallons a minute. Practically all the water reappears in the large springs of the Fault zone which have a combined flow of more than 500,000,000 gallons a day. The average flow of the New Braunfels springs alone is around 220,000,000 gallons a day. At San Antonio the discharge from wells and springs drawing from the limestone averages around 100,000,000 gallons a day. The direction and rate of movement of water in the limestone from areas of intake toward the springs and wells has been determined in parts of the Fault zone and in other parts is still under study.

The Carrizo sand is the source of water supply for a large number of towns and small cities in Texas. It has been most extensively developed in the Winter Garden District southwest of San Antonio in Dimmit, Zavala, Frio and Atascosa Counties where more than 30,000 acres of winter vegetables, fruits and other crops are irrigated from wells in the formation. The heaviest drafts on the Carrizo are in Dimmit and Zavala Counties where about 20,000 acres are irrigated. Figure 2 shows the outcrop of the Carrizo sand in a part of the Winter Garden area in Zavala and Dimmit Counties, Texas, and the artesian head in feet above sea level. Water enters the sand at the outcrop and moves down

the dip at right angles to the contours shown on the map. The artesian slope is represented by the distance between the contours and drop in pressure between them, which is 25 feet. In 1932, by using the artesian slope shown on this map the thickness and permeability of the sand determined by pumping tests and laboratory analyses, it was estimated that the transmission capacity of the Carrizo sand from the outcrop to the area irrigated was 24,000,000 gallons a day. The soundness of this estimate has been proved during the last eight years by the fact that the average annual pumpage from this sand has been comparable to the estimate without causing significant changes in the artesian pressures as indicated by water levels in the wells.

In March 1937 there was a sudden increase in the pumping near Pasadena amounting to about 20,000,000 gallons a day. Further increases have been made since that time and the total pumpage in the Houston-Pasadena-Katy Rice field districts now amounts to between 90,000,000 and 95,000,000 gallons a day, or about 45 per cent greater than it was in 1936. As a result there has been a severe decline in the artesian pressures which has materially lowered the water levels in all the wells of these districts and has extended out in every direction from them for 20 miles or more. The decline is continuing. From the early spring of 1939 to corresponding period in 1940 the average net decline in privately owned wells at Houston amounted to about six feet and the net decline in the City owned wells was even greater. In the Katy rice fields there was an average net decline during the year of about 2½ feet.